

REMARKS

I. Status of the Application

Claims 19-70 are presently pending in the application. Claims 37-70 are allowed. Claims 19, 23-26, 30-36 stand rejected under 35 USC § 103(a) as being obvious over U.S. Patent No. 4,984,959 to Kato in view of U.S. Patent No. 5,982,127 to Matsubara et al and/or U.S. Patent No. 4,803,895 to Nishizawa. Claims 20, 27 and 28 stand rejected under 35 USC § 103(a) as being obvious over Kato in view of Matsubara, U.S. Patent No. 5,661,387 to Stadele et al, and/or Nishizawa. Claim 20 stands rejected under 35 USC § 103(a) as being obvious over Kato in view of Nishizawa and Stadele. Claims 21-22, 29 are indicated as being allowable if rewritten to include all of the limitations of the base claim and any intervening claims. Claim 19 has been amended.

Applicants thank the Examiner for the courtesies extended to Greg Cohan in the telephonic interview conducted on August 21, 2003.

The foregoing amendments in view of the following remarks are believed to place all pending claims of this application in condition for allowance. Accordingly, reconsideration of the application and allowance of claims 19-70 as now submitted is respectfully requested.

II. Replacement Drawings Included

Attached are replacement sheets for FIGS. 5 and 7C, the changes for which were approved by the Examiner in the Office Action.

II. Claim 19 is in Proper Form

Claim 19 has been objected to on the grounds that the phrase "gripper" at line 3 should read "gripper part." Claim 19 has been amended at line 2 to delete the term "part," so that the

phrase "gripper" is consistent throughout all the claims, and at line 8 to correct a typographical error, and is now believed to be in proper form.

III. Claims 19, 23-26, and 30-36 Are Nonobvious Over Kato and Matsubara

Claims 19, 23-26, 30-36 stand rejected under 35 USC § 103(a) as being obvious over U.S. Patent No. 4,984,959 to Kato in view of U.S. Patent No. 5,982,127 to Matsubara et al. This rejection is respectfully traversed.

Kato discloses a robotic arm having a body 1, a trunk 2, a shoulder 31a, an upper arm 31e, a forearm 51e connected to upper arm 31e by an elbow, and a wrist 51c holding a hand device 7. Motors (16a, 14a, etc.) are housed in body 1.

Matsubara discloses a robot 1 having a vertically movable mount structure 2. A balancing device A comprises a pair of springs 6 in series with a wire 7. Balancing device A is secured at one end to a bottom of robot 1 and at its other end to a bracket 9, which moves vertically with mount structure 2. A first operating arm 10 is rotatably supported by mount structure 2. A second operating arm 14 is rotatably supported at one end by first operating arm 10. A rotation shaft 16 is mounted on the other end of second operating arm 14.

Neither Kato nor Matsubara, alone or in combination, discloses or makes obvious a manipulator comprising a foot part and a number of members, with a second member rotatable about an elbow axis relative to a first member, and compensating means provided in a foot part for a first member and second member which, upon **rotational** movement of the members, at least partially compensate for the moment exerted by the first member relative to the foot part and by the second member relative to the elbow axis, as required by independent claim 19.

As noted by the Examiner, Kato does not disclose a compensating means. The compensating means of Matsubara is balancing device A, which is connected at one end to a

bottom of the robot and at its other end to a bracket 9, which is connected to mount structure 2, and moves with mount structure 2. The sole function of the balancing device is to balance the weight of mount structure 2 during vertical movement thereof (see, e.g., col. 1, lines 11-13, and 51-59; col. 2, lines 33-37, and 55-63; col. 3, lines 47-48; and col. 3, line 67 through col. 4, line 20). That is, the balancing device compensates for moments caused by weight only. This compensating means does not, and **cannot**, compensate for moments from the rotational movement of operating arms 10, 14.

Matsubara is clearly directed only to a weight balancing device. The sole purpose of the compensating device of Matsubara, and, in fact, its only functional method of operation, is to compensate for vertical weight based movement. As noted in the first sentence of Matsubara, at column 1, lines 7-12

[t]he invention relates to a spring device for balancing the **vertical movements** of amount (sic) structure ... and more particularly relates to a spring device including one or a plurality of tension coil springs for balancing the **vertical movements** of amount (sic) structure of a multi-joint robot. (Emphasis added).

Further, the specification of Matsubara goes on to discuss the problems of the prior art, and, that with which Matsubara is concerned. Namely, as recited at column 1, lines 27-30:

[I]n order to effectively balance the **up and down movements** of the mount structure of the multi-joint robot, it is required to effectively utilize the tension coil springs having the specified properties. (Emphasis added).

As noted above, the specification of Matsubara is replete with numerous references to, and discussion of, the sole purpose and function of coil springs 6. Namely, they compensate for the weight of mount structure 2, and, consequently, any members connected to mount structure 2, as mount structure 2 moves up and down. There is absolutely no disclosure or discussion of coil springs 6 providing compensating means for moments from rotational movement of mount structure 2 or rotational movement of any other components of robot 1. In fact, the construction

of robot 1 will not allow such compensation. This is true for one clear reason: the springs of Matsubara cannot compensate for moments from rotational movement.

As can be seen clearly in the figures shown in Matsubara, mount structure 2 can move only vertically with respect to the base of robot 1. As seen most clearly in Fig. 5, the rear surface of mount structure 2 is a planar, or flat, surface, which rides along a planar front surface of the base of robot 1. Mount structure 2 is restricted in its movement to an up and down movement, along threaded shaft 3. The two abutting planar surfaces of the mount structure 2 and the base of robot 1 will not allow rotational movement of mount structure 2 in the plane of the rotation (horizontal) of first operating arm 10 and second operating arm 14. Consequently, the rotational movement of first operating arm 10 and second operating arm 14 cannot be transferred to coil springs 6. The rotational forces of first and second operating arms 10, 14 are simply never felt by coil springs 6, and, therefore, coil springs 6 clearly cannot compensate at all for any moments from rotational movement, as required by independent claim 19.

Although the Examiner states that "the springs must at least partially compensate for any force placed on them, rotational or otherwise," there is simply no force placed on the springs from rotational movement of first and second operating arms 10, 14. Thus, the coil springs 6 **cannot** compensate for moments caused by their rotational movement.

The Office Action fails to address the point that there is no motivation or suggestion in either Kato or Matsubara to suggest putting the compensating means taught by Matsubara, namely, a spring device that compensates solely for weight moments, in the device of Kato to compensate for moments from the rotational movement of upper arm 31e and forearm 51e. In order to make a prima facie case of obviousness, the Examiner must show that there is motivation or suggestion in either Kato or Matsubara for the proposed combination. The

purpose of Matsubara is to compensate for weight in the vertical movement of mount structure 2. There is nothing in Matsubara that would provide motivation or suggestion for one to use such coil springs to compensate for moments from rotational movement, and the Examiner has not indicated any such motivation or suggestion in the specification of Matsubara. Further, as conceded by the Examiner, there is no compensating means in Kato, and, therefore, there is also no motivation or suggestion in Kato to provide compensating means, let alone compensating means to compensate for moments from rotational movements.

Thus, one skilled in the art would not look to Matsubara's teachings of a spring-based device that compensate solely for weight in a vertical direction to compensate for moments from the rotational movement of the operating arms of Kato. Consequently, the claimed compensating means is not disclosed or made obvious by the combination of Kato and Matsubara, and the rejection should be withdrawn. Claims 23-26, and 30-36, each of which depends from claim 19, are believed to be allowable as well.

IV. Claims 20, 27, and 28 Are Nonobvious Over Kato, Matsubara, and Stadele

Claims 20, 27, and 28 stand rejected under 35 USC § 103(a) as being obvious over Kato in view of Matsubara and U.S. Patent No. 5,661,387 to Stadele et al. This rejection is respectfully traversed.

Stadele fails to overcome the deficiencies of Kato and Matsubara noted above. Specifically, Stadele fails to disclose or make obvious compensating means provided in a footpart for a first member and second member which, upon **rotational** movement of the members, at least partially compensate for the moment exerted by the first member relative to the foot part and by the second member relative to an elbow axis, as required by independent claim

19, from which claims 20, 27 and 28 depend. Stadele simply has no compensating means. Accordingly, the rejection is improper and should be withdrawn.

V. **Claims 19, 23-26, and 30-36 Are Nonobvious Over Kato and Nishizawa**

Claims 19, 23-26, 30-36 stand rejected under 35 USC § 103(a) as being obvious over Kato in view of U.S. Patent No. 4,803,895 to Nishizawa. This rejection is respectfully traversed.

Nishizawa discloses a balancing mechanism for a robot. A swivel support body 10 is mounted on a swivel slide 2 that is rotatably mounted to a base 1 of a robot. A first vertical arm 4 is pivotally mounted to an end of body 10, and a second horizontal arm 5 is pivotally mounted to arm 4. A wrist 6 is mounted at an end of second arm 5. The balancing mechanism for vertical arm 4 comprises a horizontal shaft 12 pivotally supported on body 10, a first link 14 pivotally connected to vertical arm 4, a first lever 16 pivotally mounted on body 10, and a first spring 18 pivotally supported by a pin 19 on body 10 at one end and at its other end to lever 16. The balancing mechanism for horizontal arm 5 comprises a shaft 21 that rotatably couples arm 5 to arm 4, an L-shaped lever 22 rotatably mounted on shaft 12, a second link 25 pivotally connected between lever 22 and arm 5, a third link 27 pivotally coupled to lever 22, a third lever 29 pivotally supported on body 10, and a second spring 31 pivotally supported at one end by pin 19 on body 10 and at its other end to lever 29.

Neither Kato nor Nishizawa, alone or in combination, discloses or makes obvious a manipulator comprising a foot part and a number of members, with a second member rotatable about an elbow axis relative to a first member, and **compensating means provided in a foot part** for a first member and second member which, upon rotational movement of the members,

at least partially compensate for the moment exerted by the first member relative to the foot part and by the second member relative to the elbow axis, as required by independent claim 19.

As noted by the Examiner, Kato does not disclose a compensating means. The compensating means of Nishizawa is not located in a foot part of Nishizawa. As can be seen clearly in Figs. 1a-c, and 2, the compensating means of Nishizawa, which comprises the balancing mechanisms described above, is located above base 1 and none of it is located in base 1. Thus, it is not located in a foot part for a first member and second member. Consequently, the proposed combination of Kato and Nishizawa simply does not disclose the required limitation.

Further, it would not have been obvious to modify Kato, given the teachings of Nishizawa, to provide a compensating means in a foot member. Nishizawa, in fact, teaches away from providing a compensating means in a foot member. The balancing mechanism of Nishizawa has a number of levers, links, pins and springs that are directly connected to operating arms 4 and 5. In order for the compensating mechanism to work, it must necessarily be positioned above base 1, since it must be in direct contact with arms 4 and 5. To place a balancing mechanism in a foot part would defeat the purpose of the balancing mechanisms of Nishizawa. Accordingly, one skilled in the art would not have been motivated to modify Kato by placing the balancing mechanisms of Nishizawa in the body 1 of Kato and, in fact, would have been taught away from the use of a compensating means in a foot part. Consequently, the rejection is improper and should be withdrawn.

VI. Claim 20 is Nonobvious over Kato, Nishizawa and Stadele

Claim 20 stands rejected under 35 USC § 103(a) as being obvious over Kato in view of Nishizawa and Stadele. This rejection is respectfully traversed.

Stadele fails to overcome the deficiencies of Kato and Nishizawa noted above. Specifically, Stadele fails to disclose or make **obvious compensating means provided in a footpart** for a first member and second member which, upon rotational movement of the members, at least partially compensate for the moment exerted by the first member relative to the foot part and by the second member relative to an elbow axis, as required by independent claim 19, from which claim 20 depend. Stadele simply has no compensating means in a foot part. Accordingly, the rejection is improper and should be withdrawn.

VII. Claims 20, 27, and 28 Are Nonobvious Over Kato, Nishizawa, Matsubara, and Stadele

Claims 20, 27, and 28 stand rejected under 35 USC § 103(a) as being obvious over Kato in view of Nishizawa, Matsubara and Stadele et al. This rejection is respectfully traversed.

Stadele fails to overcome the deficiencies of Kato, Nishizawa and Matsubara noted above. Specifically, Stadele fails to disclose or make **obvious compensating means provided in a footpart** for a first member and second member which, upon **rotational movement** of the members, at least partially compensate for the moment exerted by the first member relative to the foot part and by the second member relative to an elbow axis, as required by independent claim 19, from which claim 20 depend. Stadele simply has no compensating means in a foot part that can compensate for moments from rotational movement. Accordingly, the rejection is improper and should be withdrawn.

VIII. Claims 21-22, 29 Are Allowable in Their Present Form

Applicant thanks the Examiner for the indication that claims 21-22, 29 would be allowable if rewritten to include all of the limitations of the base claim and any intervening claims.

Since claim 19 is believed to be allowable, as discussed above, claims 21-22, and 29, which depend from independent claim 19, are believed to be allowable in their present form.

In view of the foregoing amendments and remarks, pending claims 19-70 are believed to be allowable, and an indication to that effect from the Examiner is respectfully requested at this time. If a telephone conversation with applicant's attorney would expedite prosecution of the above-referenced application, the Examiner is urged to call the undersigned at the number below.

Please apply any required charges or credits to our Deposit Account No. 19-0733.

Respectfully submitted,

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